

## **THE ROLE OF A THIRD STAR IN THE FORMATION OF CLOSE BINARIES**

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The formation of close binary stars requires the extraction of a large fraction of the angular momentum of the original star forming cloud. Theoretical models suggest that most of the angular momentum is deposited in the orbital motion of a distant third star, and there is evidence from ground-based studies that many close binaries do indeed have a tertiary companion. Kepler observations of eclipsing binaries offer us an important opportunity to search for such tertiary stars by measuring the deviations in eclipse times caused by light travel time variations as the binary moves about the triple star system center of mass and by perturbations in the inner orbit caused by the gravitational influence of the third star. We have begun a program of eclipse timings with Kepler that indicates that 16 of 41 (39%) eclipsing binaries have third companions with period of a few years. Here we propose to greatly enlarge the sample in order to determine if this same fraction is found among eclipsing binaries with periods larger than a few days (the typical orbital period of systems in the original sample). The primary advantages of the new survey are an increase the overall sample size by a factor of three, a greatly expanded range of eclipsing binary periods, and much better sensitivity in the detection of long outer periods by leveraging the long time interval between Kepler observations in Cycle 1 and 4. This survey of eclipsing binaries will determine the frequency and character of their low mass companions. These properties will offer important clues about the star formation process and the role played by third stars.